By rearranging Mr. Palmer's table in the order of temperatures, we get the following result:

Year.	Temperature.	Precipitation.
	°	*Inches.*
1896	24	1.06
1898	28	0.83
1895	30	1.30
1893	31	0.79
1891	33	0.60
1897	33	0.68
1892	35	0.50
1894	37	0.28
1895.5	28.2	0.97
1893.5	34.5	0.52

By averaging the first four and the last four years, we get values for the two groups, as shown in the last two lines of this table; and there can be no doubt but what there is a definite relation between the average November temperature and the total November rainfall. Similar relations exist for nearly all parts of the globe. A large precipitation generally means a proportionately large amount of cloudiness and, therefore, a small amount of sunshine. There are, however, some regions where the heat received from the sun during clear weather is so small that a continuous cloudy layer, acting as a blanket to prevent radiation, maintains a higher temperature while at the same time giving more precipitation.

NOTES FROM THE DECEMBER REPORTS OF THE CLIMATE AND CROP SECTIONS.

ALABAMA.

Mr. F. P. Chaffee notes that during a severe hailstorm at Montgomery on December 2, lasting about four minutes, there was no unusual change either in temperature or pressure, such as usually accompany the fall of hail during the summer season. The rapid oscillations of the barometer during hailstorms, as shown by a barograph record, are not yet completely explained. Doubtless, in many cases a satisfactory explanation can be given, but not in other cases. A comparative study of the hailstorms without barometric fluctuations, as compared with those that show such, would doubtless be very instructive.

ARIZONA.

Mr. W. G. Burns notes that the month has been remarkable for the general severity of the weather, the average deficiency of temperature was nearly 5°, a snowstorm prevailed on the 9th and 10th, over three-fourths of the Territory, and the fall amounted to nearly 30 inches at some mountain stations. But notwithstanding this unusual phenomenon the citrus fruit did not seem to have suffered any injury. It is hard to believe that such unusual weather in Arizona may not be followed by similar unusual cold and snow over the regions to the eastward. Thus, we notice that in New Mexico the month has also been very cold, the average for the State being below the normal with an unusual amount of snow in the mountains. Arkansas shows 3.9° below the normal, but the average rain and melted snow was not above but rather below the normal. Louisiana gave a temperature of 5.2° below the normal, but the precipitation was also below.. In general, therefore, as we proceed eastward from Arizona, the temperature was uniformly below the normal, but the excess of rain and snow which prevailed in the Rocky Mountain region, disappears as we approach the Mississippi River and enter the region where low temperatures are produced by the southward flow of the cold, dry northers. This antithesis between cold, wet weather on the west, and cold, dry on the east is but an ordinary case illustrating the great variety of combinations that occur in climatology.

CALIFORNIA.

The report for December prints quite an extensive memoir by Dr. Marsden Manson, on the laws of climatic evolution. This is a problem that has always interested the geologist, but has, of course, very little to do with the practical problems of modern meteorology. As a rule we must utilize our knowledge of present conditions in order to throw light upon the nature of the climates that prevailed in past ages, and we can scarcely utilize the latter in studying current climatology. As Mr. Manson's memoir will, probably, be published in the Proceedings of the British Association for the Advancement of Science, it will, doubtless, attract the attention of the geologists who are especially interested in it, and who, if we mistake not, have already taken into consideration the special ideas that Mr. Manson has dwelt upon. The same mail brings us the latest discussion of this subject by Lord Kelvin in a pamphlet entitled The Age of the Earth, published by the Victoria Institute in London. The study of this pamphlet shows us that, even after making the most generous allowances, the subject is still beyond our grasp. The exact scientific work of the last century has not yet afforded a sufficiently secure basis for argument as to what was the temperature of the earth's crust, or the condition of the earth's atmosphere millions of years ago. Still men must attempt to reply to the questions that crowd upon us when we study geology and paleontology. It becomes evident that there must have been some form of climatic evolution, but the best theories that we can elaborate to-day are liable to be upset to-morrow, because they have involved so many assumptions and must give place to facts when these have been established by the general progress of knowledge. We would not discourage scientific speculations as they play an important part in stimulating the search for facts to support them; but when facts and principles are once well established, *these* constitute science, and the speculations with which they did not harmonize, give place to something else nearer the truth.

COLORADO.

With regard to snow in the mountains, Mr. F. H. Brandenburg says:

> While it is true that more snow usually falls after January 1 than before that date, agriculturists of Colorado and abutting territory attach great importance to the amount received early in the winter, for these snows solidify, and consequently do not melt until late in the season, thus furnishing a water supply after the snows of spring have melted and passed off.

He adds that during December the snowfall has been very large, the temperature low, and the winds high. These are the conditions that usually go together in mountainous countries. He ventures general predictions as to the amount of water that will be available for irrigation during the summer season of 1899, which we condense as follows:

> Arkansas watershed: the flow will be much greater than in 1898, and of longer duration. South Platte watershed: the flow will be much greater than for a number of years, and be prolonged beyond the usual time. Rio Grande watershed: a heavy and prolonged flow. Gunnison watershed: the flow will be very close to the normal. Grand watershed: prolonged and plentiful water supply.

GEORGIA.

Mr. J. B. Marbury publishes a detailed letter from Mr. T. O. Skellie, who maintains that the failures in the peach crop have been generally due to frost, and can be prevented by a proper attention to frost protection, either by smudges or by any other practicable means.

We ought to learn from our successes and failures between 1890 and and 1898, that nature will not do all the work, but if given a little help in the right manner and at the right time, she will make a grand success of her work.

We could not have a better illustration of the general principle that the crops raised by human labor and care are so largely dependent upon the intelligence of man that it is almost impossible, by the study of statistics, to demonstrate the influence of the climate as such.

ILLINOIS.

Mr. C. E. Linney states that, as regards the protection of winter wheat by snow there are conflicting reports during the present season. It seems that the snow afforded little protection, and the greater warmth of the southern half of the State gave opportunity for some damage by freezing and thawing. However, both of the spells of very cold weather were preceded by snowfalls of from 1 to 3 inches, thereby affording some protection.

In general, it has been long since recognized that a freshly sown plowed field is greatly affected by freezing and thawing, and that a continuous covering of snow is the best condition for winter wheat. Many measurements have been made of the temperature within and above the snow covering. Prof. A. Woeikof has collected a great deal of data on this subject in his memoir on the influence of the snow covering the ground, on the soil, the climate, and the weather. There are many cases in which the soil may be 20° or 30° warmer than the air at the surface of the snow. The influence of the snow in protecting the soil from cold is greater in proportion as the snow itself is lighter and drier. Woeikof proposes many items of experimental and observational research bearing upon practical matters that affect the crops, the railroads, and the work of the meteorological bureaus in Russia, Canada, and the United States. The general importance of this subject is so thoroughly appreciated in the United States that we may, with confidence, expect many of our own observers to make measurements of the temperature above and below the snow daily, so that we may have a more definite idea of the total amount of protection afforded by the snow in each of the winter months. Some of the agricultural experiment stations have already given attention to this subject, and would, doubtless, welcome the cooperation of our voluntary observers.

IOWA.

Mr. J. R. Sage quotes from Science a paragraph to the effect that the Southern Pacific Railroad Company has supplied 181 of its stations with an outfit of meteorological instruments, and that weekly crop reports are forwarded from 52 of these. There are doubtless many other railroads that would further the best interests of the farmers within their territory, and, eventually, their own best interests by encouraging the regular returns of rainfall, temperature, wind, and sunshine, as being the elements that most directly affect the farmers.

The phenomenal rain which deluged Des Moines County, Iowa, on the morning of August 6, 1898, is the subject of a special article by Mr. M. Ricker. The readers of the MONTHLY WEATHER REVIEW will perhaps be surprised to find no mention of this cloud-burst in the text of the REVIEW for that month; but this is explained by the smallness of the area over which the phenomenal fall occurred. However, they will find confirmatory evidence of the torrential fall in Table XI, page 388, and additional particulars are furnished in the following paragraphs by Mr. A. J. Henry.

A measurement of the rainfall caught by a standard rain gauge during the storm in question was made by Mr. G. W. Scofield, voluntary observer, United States Weather Bureau, whose station is about 7 miles north of the boundary line between Des Moines and Louisa counties. Mr. Scofield recorded 5.16 inches as falling during the night of the 15th and up to 9 a. m. of the 16th. At Wilton Junction about 35 miles north of Des Moines County, Mr. J. M. Rider, voluntary observer, recorded 4.38 inches as falling between 10 p. m. of the 15th and 8 a. m. of the 16th. The fall at other points to the northward and northeastward of Des Moines County was heavy, but not uniformly so. The Weather Bureau station at Davenport recorded 2.25 inches; Dr. Luke Roberts, voluntary observer at Clinton (about 70 miles northeast of Des Moines), 3.01 inches.

Mr. J. M. Brown, division engineer of the Burlington, Cedar Rapids and Northern Railway, reported as follows:

On the morning of Tuesday, August 16, 1898, an unprecedented rainfall occurred in Des Moines County, Iowa.

It "washed out" several miles of track of this company from Burlington north, along a small creek called Doy Branch, and its effect was noted most on this stream and Flint River, a small stream on the north edge of Burlington, also Hawkeye Creek passing through the city of Burlington and being partly sewered by the city.

I have secured records of this rainfall varying between 9.25 and 16 inches, each person giving the record being quite sure he was correct. The records are as follows: Two of 9.25; one of 14 and one, 16 inches. From the rise in the streams I am inclined to believe 10 or 12 inches of water fell. The duration of the storm was from 3 a. m. to 7 a. m.

According to Mr. Ricker's account the area of haavy rainfall was bounded on the west by the Des Moines County line (this county is in the southeastern corner of the State and includes the city of Burlington, Iowa), on the north by the northern edge of the county, on the east by the Mississippi River, and on the south by the Flint River, which runs southeastward centrally through the county. Therefore, the area of heavy rain may be roughly described as the northern two-thirds of the county, or approximately 250 square miles. There seems to have been no regular rain gauge in Des Moines County at that time, but various measurements of the rain caught in tanks, cans, buckets, etc., lead to the conclusion that, at least sixteen inches of water fell in three hours, over an area of 50 square miles and great damage was done by the resulting flood of water. Mr. Ricker states that the map for that date shows a low pressure area reaching into Iowa, but would not warrant a forecast of general rain and that the energy liberated by such a heavy fall of rain would form an interesting study. He adds that the heaviest rainfall that has come to his notice was 15 inches at Wilmington, Del., on the 29th of July, 1839.

The Editor can not too strongly urge the importance of such studies as these upon local rains and similar phenomena. The 2,500 rain gauges that report regularly to the Weather Bureau can only give a general view of the distribution of rain and must frequently fail to record these local cloud-bursts over regions of five or ten miles in diameter. Every county that is without one or more rain gauges fails to have its climatological peculiarities properly recorded. Certain classes of our citizens, such as the engineers and the river men should interest themselves in seeing that a sufficient number of rain gauges are placed in good hands over every State and every river watershed. Other classes, such as the physicians and the farmers may be expected to look after observations of temperature and sunshine. The August cloud-burst of Des Moines County, with a local rainfall of 16 inches in three hours must go on record as one of the most intense rainfalls that has yet been observed.

LOUISIANA.

Mr. Alexander G. McAdie continues his excellent articles on frost and frost protection. He says:

Of all the methods proposed for the protection of fruit, irrigation is perhaps the best. It has been tried in many portions of the country with different fruits and vegetables, and has generally given satisfaction. Cranberry growers have proven the positive value of flooding the marshes at time of frost. In the arid and subarid regions, where

water is not over-plentiful, there may be some objection to the too free use of water; but in Louisiana, with abundance of water, irrigation would seem to be an ideal method of protecting. * * * The climatic conditions of Louisiana differ from those of California, so that methods adopted in the latter State must be modified in order to obtain the best results.

Possibly we ought to go still further, and say that the soil and the plants must also be considered; so that, in general, a given climate will not produce the best crop except for a specific variety of soil and seed. Most of the labor that has been spent in determining a definite relation between climates and crops has assumed that the soil conditions were alike in different fields, and the results are, therefore, not applicable to other localities having different soils.

MARYLAND AND DELAWARE.

Mr. F. J. Walz publishes an interesting contribution by Mr. O. L. Fassig on ancient weather records in Maryland. He has been so fortunate as to discover records kept by Dr. Richard Brooke in 1753–1757, and probably a longer record by him may still exist in manuscript. According to Dr. Brooke's record, a severe drought prevailed during July, August, and September, 1755, and again in the same months in 1756. The great earthquake of Tuesday, November 18, 1755, was felt severely. Cold waves, with high winds, are recorded for December, 1755, and January, 1757. A local storm, in which both rain and wind were very heavy, occurred on the 22d of June, 1766. It appears to have passed over every county in Maryland, Virginia, Pennsylvania, New Jersey, and New York, and was, therefore, probably not a single tornado or cloud-burst, as we should have thought if we had had only the record of one station.

This search after old weather records should be encouraged by every section director. The Editor would call attention to the fact that the most important series of papers relating to the early explorations of America, viz, The Jesuit Relations, are now being reprinted by an enterprising firm in Cleveland, Ohio, and copies will undoubtedly be found in all the large libraries. If some one would summarize the meteorological information contained in these early records, it would form a very interesting addition to our knowledge.

MICHIGAN.

Mr. C. F. Schneider calls attention to the remarkable ice blockade which continued from December 8 until the 20th at the west end of Lake Erie. The blockade was broken by the combined efforts of tugs, ferryboats, and steamers, and when the imprisoned fleet was set free navigation closed for the season.

In commenting upon the West Indian Climate and Crop Service, Mr. Schneider quotes the value of the cuerda, as given erroneously in a note in the translation of the first weekly bulletin from Porto Rico, although the correct value was given in the second bulletin. The cuerda is a measure of area very little less than one English acre. It seems to be peculiar to Porto Rico, for certainly the word does not appear in any ordinary Spanish dictionary in the same sense in which it is used in Porto Rico, where it designates a field that is 75 Spanish varas square. But, as the vara has different values, it will be necessary to make a special study of the vara, as used in Porto Rico, before giving a more exact comparison between the cuerda and the acre.

In quoting Dr. Kedzie's investigations into the relations between meteorology and forestry in Michigan, Mr. Schneider especially quotes some observations that show that the total evaporation in an hour from a piece of Turkish toweling kept thoroughly wet, and exposed in a wind of 12 miles per hour, is four times greater than when hung in still air, and the same ratio held good on different days. The Editor would call the attention of our observers to some remarks on page 376 of his Treatise on Meteorological Apparatus and Methods, published as part 2 of the Annual Report of the Chief Signal Officer for 1887.

Owing to the small mass involved in the temperature observations by the wet-bulb thermometer, that instrument is adapted to give the momentary condition of the atmosphere. On the other hand, the large masses required in the measuring operations of the evaporometer renders this instrument important to meteorologists as a means of ascertaining the average hygrometric condition of the air during a long interval. From this point of view, therefore, this becomes an integrating hygrometer, and demands a more minute theoretical investigation than has as yet been given to it.

The report by Professor Kedzie above referred to is a part of a very practical bulletin on forestry in Michigan. Dr. Kedzie's first paragraph, "The controlling influence of climate over forest growth is well recognized," illustrates the tone of the whole article. The author is not studying the infinitesimal influence of forests on climate, but the immense influence of climate on forests. The Editor had the privilege of keeping the meteorological record at the State Agricultural College at Lansing during a portion of 1859, and he knows of no place where the mutual relations of climatology and forestry can be studied better than at Lansing, Mich.

MONTANA.

Mr. E. J. Glass, in an article on the use of the aneroid barometer for determining altitudes, gives us a table of numbers or divisors. When the aneroid has been read at upper and lower stations, and the temperatures are also known, the corresponding divisor is to be taken from Mr. Glass's table; the difference between the two observed pressures being used as the dividend, the quotient becomes the required difference of height in feet. For the sake of those who have many field computations to make, and do not wish to be bothered with a table of logarithms, the Editor prepared a small table, according to the formula of Babinet, which is published as Table No. 32, in recent editions of the Smithsonian Meteorological Tables. The method is as follows: Given the barometric pressures, B and b, at the lower and upper stations, respectively, and the mean temperature of the air between these stations, T, we take from the following table the factor, C.

T.	C.
° F.	Feet.
10	49 928
15	50 511
20	51 094
25	51 677
30	52 261
35	52 844
40	53 428
45	54 011
50	54 595
55	55 178
60	55 761
65	56 344
70	56 927
75	57 511
80	58 094
85	58 677
90	59 260
95	59 844
100	60 427

The factor thus obtained, is to be multiplied by the dfference in the pressures $B - b$, and the product divided by the sum of the pressures $B + b$; the result is the desired altitude of the upper above the lower station. Written algebraically, we have—

$$Z = C\frac{B - b}{B + b}$$

The computations are made much more easily by the aid of logarithms. The pressures must be known to within 0.001 inch, if the height is required to within one foot.

NEBRASKA.

Mr. Geo. A. Loveland urges the importance of full and accurate records, that, for instance, the record of a trace, and the zero figure when no rain or snow has fallen, should not be omitted. He adds:

In recent conversations with some of the observers it has been discovered that they observe and record on the retained copy of the report many interesting facts which are not entered on the copies sent to this office for the reason that the form does not specifically call for this data, and it was therefore assumed that this character of data was not desired. This is a mistake.

NEVADA.

Mr. R. F. Young says:

The constantly increasing interest in, and demand for, the publications of the Nevada Climate and Crop Service is sufficient evidence of the value of this work to the State and emphasizes the importance of having complete and accurate reports. During the past year more than one hundred of the public-spirited citizens of Nevada have contributed to the success of the work, and it is desired to enlist the cooperation of as many more during the present year.

OHIO.

Mr. J. Warren Smith explains his method of distributing forecasts throughout the city of Columbus, Ohio, by the utilization of the street cars. He states that it has met with such favor that he wishes to commend it to all forecast distributors. A bundle of forecast cards is handed to the conductor of the first car that passes the Weather Bureau office on its way toward the general office of the street railway company. There the bundle is handed in and placed where each conductor, as he goes to the window to make his trip report, can get a card, which is immediately posted in his car. The cards are thus displayed all the afternoon and evening, and give the forecast for the coming night and following day. On his last trip the conductor removes and destroys the card. Both the public and the press of this city unite in saying that for prompt, intelligent, and wide distribution of the forecasts and warnings this plan is one of the best. The plan is rapidly being adopted, also, by the trolley cars in the suburbs of Columbus. The Grove City Railway Company has attached small weather signal flags to the trolley rope, and finds this very satisfactory. Mr. Smith suggests that either flags or tin symbols on a short staff on one corner of the cars be set up. The old system of signals on the steam cars has been discontinued, but those on the electric cars appear to be effective.

OREGON.

Mr. B. S. Pague, in his general review of the month, states that the area of high pressure which descends upon Oregon from the north brings the coldest weather of the month, while the area of high pressure that approaches from the southwest brings the highest temperature. The "north high," as is the usual custom, was marked by almost an entire absence of dynamic heating west of the Rocky Mountains. Continued low temperatures and fair weather prevailed until this high began to dissipate. The highs moving from the north obstruct the eastward movement of the lows and keep them at a distance off the coast, thus preventing precipitation or dynamic heating or chinook winds, which are only possible in Oregon when the area of high pressure is central about southern Utah and the low area is passing eastward on or about the fiftieth parallel of north latitude.

The explanation of the foehn, first given by Professor Hann, is put very clearly by Mr. Pague, thus:

The highs from the north contain little moisture, while those from the southwest are heavily laden. Moist air expands during its rise up the side of a mountain, and is then again compressed in its descent without having any heat added or withdrawn. Furthermore, if the expansion and subsequent compression take place without the precipitation of moisture, the air will reach the same level on the leeward side of the mountain at the same temperature it had at the corresponding level on the windward side. When precipitation has occurred the air will reach the summit of the mountain at a higher temperature than before, and continuing in its descent, the original level will be reached with a higher temperature than at the starting point and the air will be much drier, and these conditions will be more marked in proportion as the original mass of air is warm and moist or cold and dry.

SOUTH CAROLINA.

Mr. J. W. Bauer records the death of one of the oldest meteorological observers in the country, whose service has extended over fifty years. Mr. Thomas P. Ravenel, of Pinopolis, Berkeley County, died on December 19, 1898. The published volumes of rainfall and temperature, by the Smithsonian Institution, credit Mr. Thomas P. Ravenel with records of rainfall and temperature from January, 1846, to March, 1861, at St. John, S. C. The work of the State weather service in South Carolina began in 1887, and Mr. Ravenel is credited by it with records from May, 1893, to December, 1898, at Pinopolis, Berkeley Co. We know nothing of his record from 1861 to 1893, but are encouraged by Mr. Bauer's brief note to hope that such records exist and may be presented by his family for preservation in scientific archives. The Smithsonian volume on rainfall also mentions the record of Mr. H. W. Ravenel, from 1854 to 1874, at Aiken, S. C. It is to be hoped that a family which has contributed two such excellent records will contribute still further to the climatology of South Carolina.

UTAH.

Mr. J. H. Smith reports that the temperature and rainfall throughout the State have been below the normal. If we rearrange the data for December, as given in the December report, we have the following figures:

Average for the State.

Year.	Mean temperature.	Precipitation.
	°	*Inches.*
1893	31.1	1.30
1896	31.0	0.46
1894	26.3	1.94
1898	23.3	0.64
1897	22.7	1.16
1895	21.0	0.78
1893, 96	31.05	0 88
1894, 98	24.80	1.29
1897, 95	21.85	0.97

The last three lines present the average of the successive pairs of the preceding lines.

Evidently, therefore, the central portion of the Rocky Mountain region is already to the east of those regions in which a lower temperature and an increased rainfall go together. The most remarkable phenomena of the month seem to have been the heavy anticyclonic winds of the 8th and 9th. At Ogden, these attained about 1 a. m. the severity of a destructive gale and continued all day long. At this time an extensive area of high pressure was advancing southward over Montana and Wyoming toward a great depression on the coast of Mexico and the peninsula of California.

WISCONSIN.

Mr. W. M. Wilson gives an interesting comparison of precipitation for December during the past twenty-five years. In general, the current month has given a very low temperature and light precipitation. This, of course, is the characteristic winter climate of regions subject to the prevalence of the cold, dry, clear weather that accompanies these areas of high pressure. At Manitowoc the record kept by Mr. Lups continuously since 1863 shows that December, 1898, had the lightest precipitation of all, and December, 1890, had slightly more. Similar results are given for Beloit and Duluth. At Milwaukee the total precipitation for the month was a few

hundredths more than in December, 1872 and 1890. Owing to the difficulty of measuring snowfall with the requisite accuracy, we may, in general, say that the Decembers of 1872, 1881, 1890, 1896, and 1898 must have been very much alike as regards the dearth of snow.

WYOMING.

Mr. W. S. Palmer finds that, as in most other States, Wyoming has had lower temperatures than the average, but not a remarkably low precipitation. If we arrange the data given by him, according to temperatures, we have the following December values:

Year.	Temperature.	Precipitation.
	°	*Inch.*
1896	32	0.10
1893	28	0.90
1891	26	0.82
1894	24	0.57
1895	23	0.45
1892	21	0.99
1897	20	0.91
1898	17	0.64
Average.	27.5	0.60
	20.2	0.75

This table shows a slight tendency toward an increase of precipitation in proportion as the temperature is lower. The small rate 0.02 for each degree of temperature is, however, affected by a large range of uncertainty, but we are probably justified in considering Wyoming as belonging to the eastern boundary of the region that extends eastward from the Pacific coast and over which low temperatures and increased rainfalls go together. To the east of this boundary we undoubtedly come upon the lower plains where in the winter season low temperatures and diminished precipitation naturally go together.

ASTRONOMY FOR THE METEOROLOGIST.

Under date of December 19, Mr. George Ling, observer, Weather Bureau, at Havre, Mont., writes:

An observer astronomically inclined is compensated for his early rising at this season by the sublime spectacle afforded by the heavens. The brilliancy of the planet Venus is supreme and presents a grand sight. This morning at 8:10 a. m. (seventy-fifth meridian time) Venus appeared in the southeast unusually large and bright, the reflection of her light from some ks. clouds passing by resembled that of the moon coming from behind a cloud, and soon afterwards a faint corona showed around the planet. I could see Venus after the sun was up, and it was easily seen by the naked eye when the sun was three degrees high.

Farther in the west was Jupiter, in Virgo, shining conspicuously, and still farther west was Mars, in Cancer, looming up bright and red. Each planet shone very large and bright in comparison with the stars. Orion was setting in the west, and his first-magnitude star, Betelgeuze, stood out prominent in the western sky. Castor, of the Twins; Cancer, with its Beehive, and now decorated by Mars; Regulus, in the Sickle; the triangle formed by Arcturus, Denebola, and Spica; Capella and the Kids; the Dipper, with its "pointers" showing the way to the north Polar Star, all added to the splendor of the scene. Here and there a shooting star flashed in sight, but soon all was obliterated as the circle of illumination rose higher and higher.

Mr. Ling's beautiful description of the starry skies encourages us to hope that he will prepare for the careful observation of the meteoric showers, that interest both astronomers and meteorologists; and why may not others do so, also?

ELECTRICAL DISTRICTS.

Referring to the MONTHLY WEATHER REVIEW for August, 1897, page 352, the Editor has been informed that the town of Sparta, White County, Tennessee, is especially subject to thunderstorms and injurious lightning, which is popularly supposed to be the result of peculiarities in its location. It is situated on the east side of a small stream and on a bluff or hill, considerably higher than the land on the western side of the stream. It is said that the strong winds bringing thunderstorms from the west strike the city on the bluff with great force, that the thunderstorms themselves are much more severe than over the lowlands opposite, and that the danger from injurious lightning is much greater.

No statistics are at hand to confirm this popular belief, but if any exist we should be glad to publish them. On general principles, however, the Editor inclines to the opinion that the popular belief may very likely prove to have but little foundation in fact. Doubtless there are facts that argue both for and against it.

ORIGIN OF THE WORD "BLIZZARD."

According to an article in the Weekly Record, published at Sturgis, South Dakota, January 6, 1899, the word "blizzard" was in use at least as early as 1867. In that year the Hutchinson County Herald gives an account of the blizzard that suddenly approached the town of Vermilion, calling it by that name as one in common use when applied to a sudden change from warm and balmy weather to a blinding snow with cold northwest winds.

The old settlers of South Dakota take exception to the statement that the word "blizzard" originated with a Chicago newspaper, The Advance, on the 8th of January, 1880.

SEISMIC NOISES.

In a letter received long since from Mr. John H. Eadie of Bayonne, N. J., he offered an ingenious explanation as to the origin of the seismic noises frequently heard without any appreciable earthquake shock, viz, that their origin is similar to that of the noises heard in steam-heating apparatus. As is well known, these are caused by the concussion between two masses of water coming together with considerable speed in a space that is almost entirely vacuous. The steam that should fill the pipes is easily condensed if the pipes are cold and the fall of even a drop of water through a vacuous space of ten or fifteen feet, or the rush of water from opposite directions into a space in which steam has just been condensed produces loud noises that would not be made if there were enough air in the pipe to act as a buffer. But it does not seem likely that this explanation could apply to the action of steam in the internal crevices and caves of the interior of the earth, as is suggested by Mr. Eadie, because the surfaces of these cavities can hardly be cold enough to condense the aqueous vapor to the extent necessary to cause the observed phenomena. Neither would the sudden release of gas under pressure escaping into a subterranean passage act like a water hammer unless the passage were appreciably free from air, and this seems rather unlikely.

On the whole we are inclined to adhere to our general conclusions that these subterranean noises originate in the breaking, crunching, and sliding of layers of rock and earth under great pressure.

MIROBIA AND SEICHES.

Mr. F. Napier Denison has made a special study of the minute undulations recorded upon the self-registering tide gauges, and has compared them with the curves of the self-registering barographs for a number of points on the Atlantic coast of Canada and within the Gulf of St. Lawrence and the smaller bays. He finds that these minute undula-